

CLAIMS

5 1. A method for installing underground pipe under a
ground supported structure, comprising:

10 forming first and second trenches in the ground
on opposite sides of the structure;

15 placing an axially elongated ground piercing tool in
the first trench with a ground piercing tip of the tool facing
the second trench;

20 driving the tool through the ground under the structure
toward the second trench to form an in-ground tunnel between
the first and second trenches; and

25 placing an underground pipe in the in-ground tunnel
while pulling the tool rearward from the tunnel toward the
first trench.

30 2. The method of claim 1 wherein the step of placing
an underground pipe in the in-ground tunnel comprises:

35 pre-mounting the pipe on the tool with the pipe extending
between the tip and an end portion of the tool;

40 removing the tip from the tool; and

45 pulling the tool from the in-ground tunnel leaving the
pipe in place.

45 3. The method of claim 1 wherein the step of placing

the pipe in the in-ground tunnel comprises:

5 replacing the ground piercing tip of the tool with a
pipe connector having a threaded forward end;

10 attaching the pipe to the forward threaded end of the
connector;

15 pulling the tool and pipe rearward through the in-ground
tunnel until the pipe extends between the first and second
trenches; and

disconnecting the connector from the pipe.

20 4. A system for installing underground pipe under a
surface structure according to the method of claim 2
comprising:

25 an axially elongated ground piercing tool for forming an
in-ground tunnel under a surface structure with a forward
movement of the tool in the ground under the structure, the
tool having a pointed tip portion threaded to a threaded
forward end portion of an axially extending rod portion of the
tool; and

30 a pipe carried by the rod portion for depositing in the
in-ground tunnel with a removal of the tip end portion from
the rod portion and a pulling of the rod portion rearward
leaving the pipe in place in the tunnel.

5. A system for installing underground pipe under a surface structure according to the method of claim 3 comprising:

an axially elongated ground piercing tool for forming an in-ground tunnel under a surface structure with a forward movement of the tool in the ground under the structure, the tool having a pointed tip portion threaded to a threaded forward end portion of an axially extending rod portion of the tool;

10 a pipe connector having a rearward threaded end portion for mating with and releasably connecting to the threaded forward end portion of the rod after a removal of the pointed tip portion from the rod and having a forward threaded end portion for mating with and releasably connecting to a rearward end portion of an underground pipe for pulling the pipe rearward through the in-ground tunnel with rearward removal of the tool from the tunnel.

20 6. The system of claim 5 wherein the tip portion of the tool includes an externally threaded rearward extension for mating with an internally threaded cavity in a forward end of the rod portion of the tool.

7. The system of claim 5 wherein the tip portion of

the tool includes an internally threaded rearward cavity for mating with an externally threaded forward extension from the rod portion of the tool.

5 8. The system of claim 7 wherein the rearward threaded end portion of the pipe connector comprises an externally threaded extension for mating with the internally threaded cavity in the rod portion of the tool.

10 9. The system of claim 8 wherein the forward threaded end portion of the pipe connector comprises an internally threaded cavity for receiving an externally threaded rearward end portion of the pipe.

15 10. The system of claim 8 wherein the forward threaded portion of the pipe connector comprises an axial extension carrying an externally threaded self tapping screw for cutting a thread in a hollow rearward end of a plastic pipe.

20 11. The system of claim 7 wherein the rearward threaded end portion of the pipe connector comprises an internally threaded cavity for mating with an externally threaded extension from a forward end portion of the rod of the tool.

12. The system of claim 11 wherein the forward threaded end portion of the pipe connector comprises an internally threaded cavity for receiving an externally threaded rearward end portion of the pipe.

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13. The system of claim 11 wherein the forward threaded portion of the pipe connector comprises an axial extension carrying an externally threaded self tapping screw for cutting a thread in a hollow rearward end of a plastic pipe.

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14. A ground piercing tool for the system of claim 5 comprising:

an axially elongated ground piercing tool for forming an in-ground tunnel under a surface structure with a forward movement of the tool in the ground under the structure, the tool having a pointed tip portion threaded to a threaded forward end portion of an axially extending rod portion of the tool.

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15. The tool of claim 14 wherein:

the tip portion of the tool includes an externally threaded rearward extension for mating with an internally threaded cavity in a forward end of the rod portion of the tool and

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a forward facing end portion of the rod outward of the cavity extends forward to engage a rearward facing portion of the tip portion to transmit axial driving forces from the rod portion to the tip portion.

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16. The tool of claim 14 wherein
the tip portion of the tool includes an internally threaded rearward cavity for mating with an externally threaded forward extension from the rod portion of the tool
10 and

a forward facing end portion of the rod outward of the externally threaded forward extension from the rod portion engages a rearward facing portion of the tip portion outward of the internally threaded rearward cavity in the tip portion
15 to transmit axial driving forces from the rod portion to the tip portion.

17. A pipe connector for the system of claim 5 comprising:

20 a rearward threaded end portion for mating with and releasably connecting to a threaded forward end portion of a rod and having a forward threaded end portion for mating with and releasably connecting to a rearward end portion of an underground pipe for pulling the pipe rearward through an in-

ground tunnel with rearward removal of the rod from the tunnel.

18. The pipe connector of claim 17 wherein the
5 rearward threaded end portion of the pipe connector comprises
an externally threaded extension for mating with an internally
threaded cavity in the rod.

19. The pipe connector of claim 18 wherein the
10 forward threaded end portion of the pipe connector comprises
an internally threaded cavity for receiving an externally
threaded rearward end portion of the pipe.

20. The pipe connector of claim 18 wherein the
15 forward threaded portion of the pipe connector comprises an
axial extension carrying an externally threaded self tapping
screw for cutting a thread in a hollow rearward end of a
plastic pipe.

21. The pipe connector of claim 17 wherein the
20 rearward threaded end portion of the pipe connector comprises
an internally threaded cavity for mating with an externally
threaded extension from a forward end portion of a rod.

25 22. The pipe connector of claim 21 wherein the

forward threaded portion of the pipe connector comprises an axial extension carrying an externally threaded self tapping screw for cutting a thread in a hollow rearward end of a plastic pipe.

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23. The pipe connector of claim 21 wherein the forward threaded end portion of the pipe connector comprises an internally threaded cavity for mating with an externally threaded rearward end portion of the rod.

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24. A ground piercing tool for tunneling under preexisting surface structures, comprising:

a ground piercing forward facing pointed tip including a rearward threaded portion and a radially extending shoulder outward of the threaded portion;

an elongated axially extending first rod including a forward threaded portion for mating with the rearward threaded portion of the tip,

a first radially extending shoulder outward of the forward threaded portion for engaging the radially extending shoulder of the tip and

a rearward threaded portion for mating with a forward threaded portion of an end cap or a second rod of the tool; and

an end cap having a rearward facing axial impact surface and a forward threaded portion for mating with a rearward threaded portion of the first or second rods.

25. The tool of claim 24 wherein:

5 the first rod includes a second radially extending shoulder outward of the rearward threaded portion of the first rod and

10 the end cap includes a radially extending shoulder outward of the forward threaded portion of the end cap for engaging the second radially extending shoulder of the first rod.

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